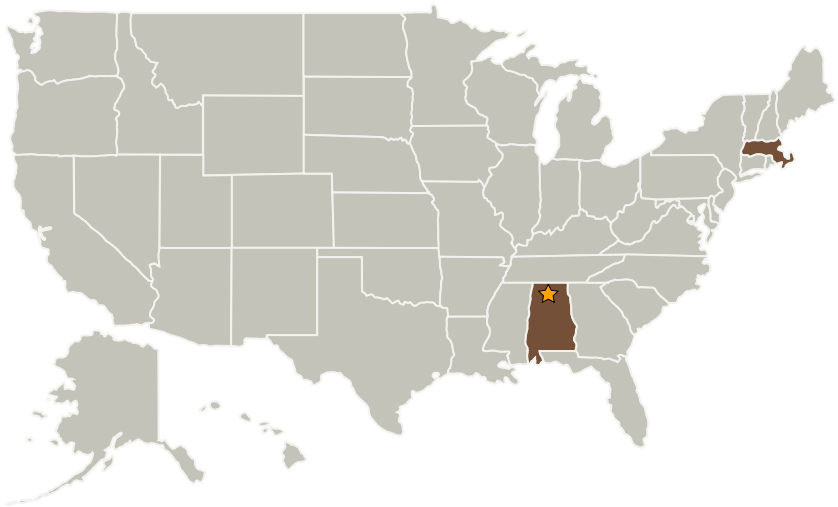
Advanced Materials and Production Technology for Very Large Solar Sail Structures, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

Solar sails are an attractive means for propulsion of future spacecraft. One potential device for deploying and supporting very large solar sails is the CoilAble boom made by ATK Space Systems - Goleta (formally AEC-Able Engineering). CoilAble's have a long and reliable track record in space. KaZaK Composites is a major developer and supplier of pultruded composite structural members used in CoilAble booms. For solar sail applications, it is important to develop advanced technologies that create the lightest possible booms. KaZaK is already pultruding advanced solar sail test hardware made with IM-9 carbon fiber as a first step toward improving solar sails. This SBIR proposal will identify a replacement for the recently out-of-production IM-9 baseline carbon fiber, and pursue three additional lines of investigation aimed at creating significant improvements in next generation solar sail structures. Specifically, we will investigate methods for making 1) near-zero CTE pultruded members of unlimited length via materials hybridization, 2) very lightweight tubular structures, with and without cores, to reduce the weight of solar sail longerons, and 3) passively damped structures achieved by additives to the matrix of pultruded composite sail materials. Mast structural elements made with least one and possibly several of these technologies will be prototyped and tested in Phase I.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Kazak Composites Incorporated	Supporting Organization	Industry	Woburn, Massachusetts

Primary U.S. Work Locations	
Alabama	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.4 Advanced Propulsion
    - TX01.4.1 Solar Sails